भारतीय मानक
Indian Standard

IS 5624 : 2021

नींव-काबले — विशिष्टि

(दूसरा पुनरीक्षण)

Foundation Bolts — Specification

(Second Revision)

ICS 21.060.10

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General Engineering and Fasteners Standards Sectional Committee, PGD 37

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the General Engineering and Fasteners Standards Sectional Committee had been approved by the Production and General Engineering Division Council.

This standard was originally published in 1970. First revision has been made in 1993 and this revision has been taken up to align the standard with the latest versions of basic standards related to masonry fasteners.

Foundation bolts are designed for use in masonry, concrete foundation and the like. The form of the shank is optional but compliance is required for the maximum dimensions specified (space requirement dimensions). The standard specifies property 4.6 for foundation bolts as the bolts are generally used with this property class. However, due to space constraints, it may be essential to use bolts having property class higher than 4.6 which shall be subject to agreement between the purchaser and manufacturer.

Following major changes have been made in second revision:

a) Scope have been clearly stated;
b) References have been updated;
c) Shank types D and G have been dropped;
d) The technical supply conditions have been completely revised; and
e) Designation of foundation bolts have been revised.

In preparation of this standard some assistance has been derived from DIN 529 : 2010-09 'Masonry and foundation bolts' issued by Deutsches Institut fiir Normung (DIN).

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

FOUNDATION BOLTS — SPECIFICATION

(Second Revision)

1 SCOPE

1.1 This standard covers the requirements for technical supply conditions of cast-in foundation bolts installed before placing concrete in the size range M8 to M72.

1.2 This standard does not cover design method for cast-in bolts subjected to static loading, fatigue loading, seismic loading, fire exposure. This standard does not provide a design method for fastenings to transmit loads. The resistance to tension loads, shear loads, combined tension-shear loads and the displacement serviceability limits have not been covered in this code.

NOTE — It depends on the base material into which the cast-in bolts are embedded; type and direction of loads; type of cast-in bolts and material used for cast-in bolts, cast-in bolt groups, number of cast-in bolts; installation procedure for cast-in bolts; dimensions of cast-in bolts; embedded material type and length of cast-in bolts; factor of safety considered in design of particular cast-in bolt group system; lever arm for shear loads; failure of metal part of cast-in bolt for tension and shear load with/without lever arm; pull-out failure of cast-in bolt/bolts for tension loads; masonry breakout failure for tension loads; pull out of one brick masonry for tension loads; influence of joints for tension loads and shear loads; local brick masonry failure for shear loads; brick masonry edge failure for shear loads, pushing out of one brick masonry for shear loads; edge distance; thickness of masonry base member; masonry base material compressive strength; Technical Assessment data of cast-in bolts as per regulations.

1.3 Cast-in foundation bolts complying with this standard shall be designed using relevant standards.

1.4 This standard is not applicable to post-installed mechanical metal fasteners and bonded fasteners placed into pre-drilled holes for connecting structural elements and non-structural elements to structural components.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
1363 (Part 1) : 2019/ ISO 4016 : 2011	Hexagon head bolts screws and nuts of product grade C
1363 (Part 2) : 2018/ ISO 4018 : 2011	Hexagon head bolts screws and nuts of product grade C
1363 (Part 3) : 2018/ ISO 4034 : 2012	Hexagon head bolts screws and nuts of product grade C: Part 3 Hexagon nuts size range M5 to M64
1367 (Part 1) : 2014/ ISO 8992 : 2005	Technical supply conditions for threaded steel fasteners: Part 1 General requirements for bolts screws studs and nuts
1367 (Part 2) : 2002/ ISO 4759-1 : 2000	Technical supply conditions for threaded steel fasteners: Part 2 Tolerances for fasteners — Bolts screws studs and nuts — Product grades A B and C
1367 (Part 3) : 2017/ ISO 898-1 : 2013	Technical supply conditions for threaded steel fasteners: Part 3 Mechanical properties of fasteners made of carbon steel and alloy steel — Bolts screws and studs
1367 (Part 11) : 2020/ISO 4042 : 2018	Technical supply conditions for threaded steel fasteners: Part 11 Electroplated coatings
1367 (Part 13) : 2020/ISO 10684 : 2004	Technical supply conditions for threaded steel fasteners: Part 13 Hot-dip galvanized coatings on threaded fasteners
1367 (Part 17) : 2005/ISO 3269 : 2000	Industrial fasteners — Threaded steel fasteners — Technical supply conditions: Part 17 Inspection sampling and acceptance procedure
1367 (Part 18) : 1996	Industrial fasteners — Threaded steel fasteners — Technical supply conditions: Part 18 Packaging
1368 : 2018/ ISO 4753 : 2011	Dimensions for ends of parts with external ISO metric threads

IS No.	*Title*
1369 (Part 1) : 1993/ ISO 3508 : 1976	Fasteners — Thread run-outs and undercuts: Part 1 Dimensions for screw thread run-outs for external ISO metric threads
1369 (Part 2) : 1993/ ISO 4755 : 1983	Fasteners — Thread runout and undercuts: Part 2 Dimensions for screw thread undercuts for external ISO metric threads
1369 (Part 3) : 1995	Fasteners — Thread run-outs and undercuts: Part 3 Dimensions for screw thread run-outs and undercuts for internal threads blind tapped holes
4218 (Part 1) : 2001/ ISO 68-1 : 1998	ISO general purpose metric screw threads: Part 1 Basic and design profiles
4218 (Part 2) : 2001/ ISO 261 : 1998	ISO general purpose metric screw threads: Part 2 General plan
4218 (Part 3) : 1999/ ISO 724 : 1993	ISO general purpose metric screw threads: Part 3 Basic dimensions
4218 (Part4) :2001/ ISO 262 : 1998	ISO general purpose metric screw threads: Part 4 Selected sizes for screws bolts and nuts
14962 (Part 1) : 2018/ISO 965-1 : 2013	ISO general purpose metric screw threads — Tolerances: Part 1 Principle and basic data

3 TECHNICAL SUPPLY CONDITIONS

Dimensions and Preferred Length-Dia Combination		Table 1
Material		Steel
General requirements		IS 1367 (Part 1) : 2014/ISO 8992 : 2005
Thread	Tolerances	8g
	Indian Standards	IS 14962 (Part 1): 2001- ISO 965-1
Mechanical Properties	Property Class	4.6
	Indian Standard	IS 1367 (Part 3) : 2002- ISO 898-1*
Tolerance	Produce Grade	C
	Indian Standard	IS 1367 (Part 2) : 2002- ISO 4759-1
Finish		As produced or Hot-dip galvanized, IS 1367 (Part 13): 1983, if agreed between supplier and purchaser. or Electroplated Coatings, IS 1367 (Part 11): 2002- ISO 4042, if agreed between supplier and purchaser.

*Materials other than those specified may be agreed to between the purchaser and the supplier.

4 SHANK FORMS

The form of shank shall be as agreed to between the purchaser and the supplier. However, some typical shank forms and their dimensions are given in Annex A.

5 DESIGNATION

The foundation bolts shall be designated by the nomenclature, thread size, length, property class and number of this standard.

Example:

A foundation bolt of thread size M20, length 200 mm and property class 4.6 shall be designated as:

Foundation Bolt-M20X200-4.6-IS 5624

4.1 When foundation bolts are required/supplied with hexagon nuts conforming to IS 1363 (Part 3) : 2002 -ISO 4034, letter ‘Mu’ shall be added after length, in the designation.

Example:

A foundation bolt of thread size M20, length 200 mm and property class 4.6 supplied with hexagon nut shall be designated as:

Foundation Bolt-M20 X 200-4.6-Mu-IS 5624

4.2 If foundation bolts are to be hot dip galvanized the word ‘GALV’ shall be added at the end of the designation.

Example:

A foundation bolt of thread size M20, length 200 mm, property class 4.6 and hot dip galvanized shall be designated as:

Foundation Bolt - M20 X 200-4.6-IS 5624-GALV

4.3 In addition, type of the shank form required may also be indicated with the designation. However, if no shank form is specified in the designation it shall be at the discretion of the manufacturer.

6 GENERAL REQUIREMENTS

In respect of requirements not covered in this standard, the nuts shall conform to IS 1367 (Part 1) : 2014/ ISO 8992 : 2005.

7 SAMPLING

Sampling and criteria for acceptance shall be in accordance with standards.

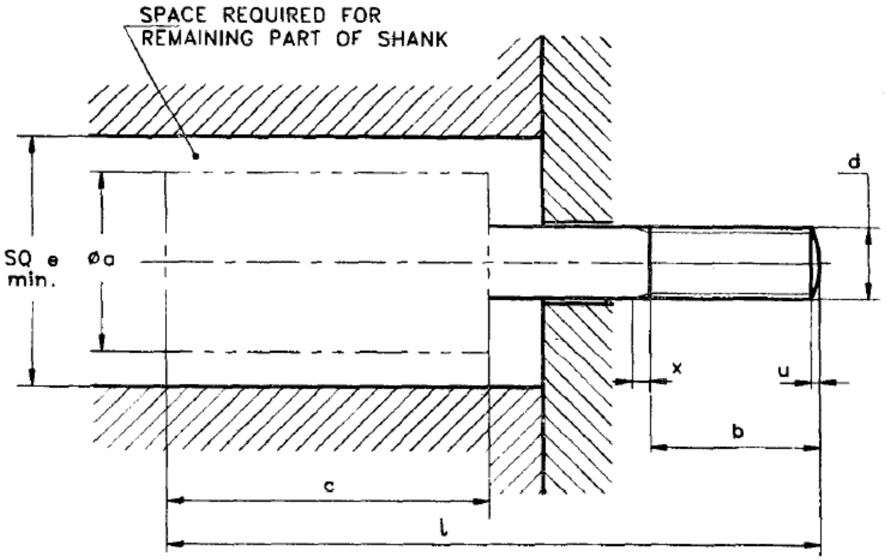
8 MARKING AND MODE OF DELIVER

8.1 The marking of bolts and mode of delivery shall be in accordance with IS 1367 (Part 3) : 2002/ISO 898-1 and IS 1367 (Part 18) : 1996 respectively.

Table 1 Dimensions and Preferred Length Diameter Combinations

(*Clause* 3)

All dimensions in millimeters.



b	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M30**	**M36**	**M42**	**M48**	**M56**	**M64**	**M72x6**
d	20	25	30	40	50	60	75	90	105	120	140	160	180
a Max	25	32	40	55	65	80	100	120	140	160	185	210	250
c Max	55	55	70	90	110	130	160	190	230	260	290	340	370
e	35	45	55	70	85	100	120	140	160	180	210	250	290

Table 1 (*Concluded*)

b	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M30**	**M36**	**M42**	**M48**	**M56**	**M64**	**M72x6**
						Length l							
80	▨												
100	▨	▨											
125	▨	▨	▨										
160	▨	▨	▨	▨									
200	▨	▨	▨	▨	▨								
250		▨	▨	▨	▨	▨							
320			▨	▨	▨	▨	▨						
400				▨	▨	▨	▨	▨					
500				▨	▨	▨	▨	▨	▨				
630					▨	▨	▨	▨	▨	▨			
800					▨	▨	▨	▨	▨	▨	▨		
1000						▨	▨	▨	▨	▨	▨	▨	
1250						▨	▨	▨	▨	▨	▨	▨	
1600							▨	▨	▨	▨	▨	▨	▨
2000							▨	▨	▨	▨	▨	▨	▨
2500								▨	▨	▨	▨	▨	▨
3200										▨	▨	▨	▨

NOTES

1 The range of preferred length is indicated by stepped lines. No tolerances have been specified for length l. They depend on the respective shapes of the customary bolts.

2 The diameter of the unthreaded shank portion may be either equal to the thread diameter (normal shank) or approximately equal to the pitch diameter (reduced shank), at the manufacturer's discretion.

3 Short dog point or long dog point thread ends shall be according to IS 1368 : 2003/ISO 4753, at the manufacturer's discretion.

4 Dimension 'u' (incomplete thread) shall not exceed 2P. P is the pitch of thread.

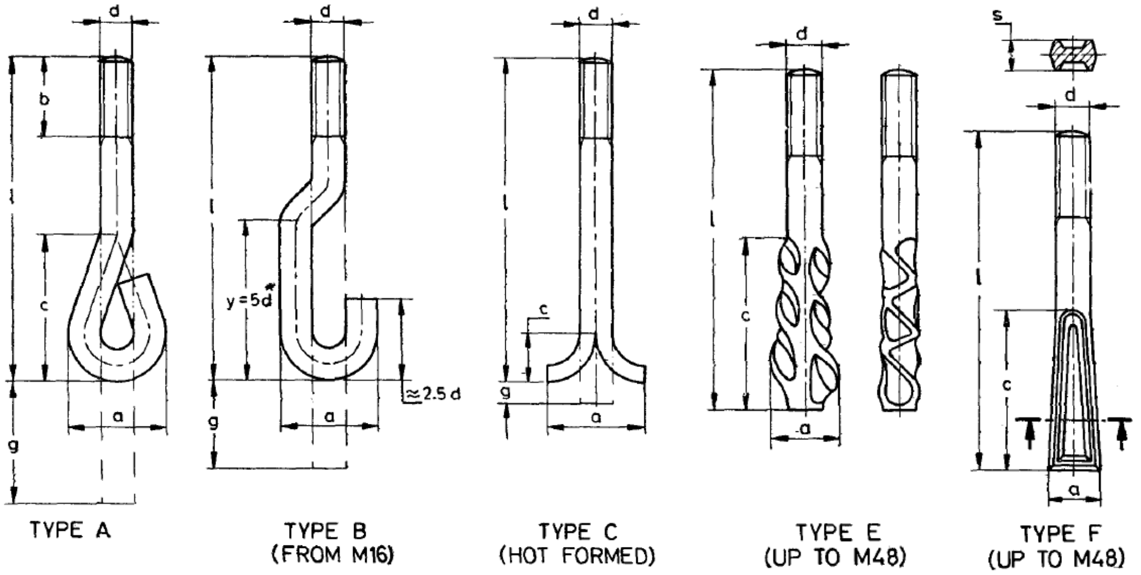
5 Dimension 'x' shall be as specified in IS 1369 (Part 1) : 1993/ISO 3508; IS 1369 (Part 2) : 1993/ISO 4755; IS 1369 (Part 3) : 1995.

6 Tolerance on $65\,^{+2P}_{\;\;0}$.

ANNEX A

(*Clause* 4)

TYPES AND DIMENSIONS OF TYPICAL SHANK



TYPE A

TYPE B (FROM M16)

TYPE C (HOT FORMED)

TYPE E (UP TO M48)

TYPE F (UP TO M48)

NOTE — *Higher value of y shall be subject to agreement.

g = Straight length.

All dimensions in millimeters.

Thread Size, d		M8	M10	M12	M16	M20	M24	M30	M36	M42	M48	M56	M64	M72 × 6
a ± 3	A, B	24	30	36	48	60	75	95	115	135	155	180	200	240
	C, E	16	20	24	32	40	48	60	72	85	98	–	–	–
	F	14	16	20	25	30	35	45	55	65	75	–	–	–
c ± 5	A	45	55	65	85	105	125	155	190	220	250	290	335	370
	C	12	15	18	24	30	36	45	54	63	72	84	96	110
	E	45	55	70	90	100	135	150	180	260	260	–	–	–
	F	50	50	55	85	95	120	130	190	200	220	–	–	–
g ≈	A	30	38	45	60	75	90	115	135	155	180	210	235	260
	B	–	–	–	45	55	70	90	110	125	140	165	185	215
	C	5	7	8	11	14	18	24	30	34	40	45	50	60
	F	6	8	10	14	18	22	26	30	36	42	-	-	-
s	F	6	8	10	14	18	22	26	30	36	42	-	-	-

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

General Engineering and Fasteners Standards Sectional Committee, PGD 37

Organisation	*Representative(s)*
Personal Capacity	Shri N. Srinivasa Murthy (***Chairman***)
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Shri Narender Reddy Beesu
Scientist 'D' (PGD), BIS

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